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Towards Fostering Play Between Separate Spaces in a Public Venue

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HCI has a longstanding interest in facilitating impromptu play between both colocated or remotely located unacquainted people. Less explored is fostering play between people in close, but separate locations. We present early results from a project investigating if ICT can facilitate new social play encounters through connecting different levels of a children's play centre. We designed and deployed two large-scale interactive mockups of robots: a creature with an enormous tongue; and a device that physically raised children's artworks to offer them as drawing stencils to users one storey above. Although our operation of these mockups was very ad hoc, our field-testing identified several promising insights. We suggest opportunities for further exploration in designing to connect separate places and advice for design researchers conducting similar tests.

Social play; remote play; colocated play; social icebreaking, provotypes, children

1. INTRODUCTION

Electronic installation artists such as Snibbe (2009) have had success in enabling unfamiliar children to play together, but efforts to design colocated icebreaking systems are dwarfed by the success of networked gaming. Online game systems have enabled millions of remotely located, non-acquainted children to play together. Location-based games such as *Pokemon-Go* have also resulted in many children having colocated social encounters with strangers (Pasovaara et al. 2017). Mixing the online and face-to-face realms in a different way, Karrahalios. developed useful principles for how designing social catalysts to connect two specific physical places should attempt to blend the most pro-social features of physical and digital encounters (2009). However, despite children turning out to some of the most intense users of her *Telemurals* installation, we are not aware of any attempts to design similar digital-physical remote catalysts specifically for children. Also less explored are attempts to foster play between children who are in close, but separate locations, i.e. in different rooms at the same site. We see investigating such scenarios as valuable for two purposes: a) for designing pro-social augmentation of such contexts; and b) for how understanding this middle ground between remote and colocated interaction might provide insights for both ends of this continuum.

This project began as an investigation of how the unusual architecture of a well-known children's culture house might influence the experience of its visitors. The building was designed to offer visual connections between its different spaces through portals, or viewpoints in walls and a glass floor/ceiling (figure 1).

To explore the potential for fostering play that connects different spaces, we initially adopted a no-to-low-tech interventionist approach. Shirky's proclamation that "*Communications tools don't get socially interesting until they get technologically boring*" (2008) and a wish to rapidly gain insights inspired our low-tech approach. We were also influenced by how "provocative prototyping" [1] offers a way to surface unspoken frictions among stakeholders, and designarily "breaching experiments" (Heinemann and Mitchell 2013) as a means to probe social order. We deployed two large-scale cardboard mockups of robots, each containing a researcher operating the contraption in a "Wizard of Oz" (Riek 2012) fashion.

1.2 About the children's cultural venue

The playhouse we studied is a publicly owned cultural attraction. The venue comprises six large rooms spread over four stories. Each room is equipped to support distinct play experiences. For instance, the "physical playroom" features a suite of climbing ropes and a large selection of circus-style toys. Whereas, on the top floor, a room with cushions and a very intricate mural was hoped to

support quieter, contemplative play moments. The "grotto" is a UV lit, darkened, multi-level space decorated with arctic themed forms. The craft room offers a range of constructive activities such as painting, printing, collage, and woodwork. Computing is not a feature of any of the spaces.

We focus our investigation on the potential for connecting different play spaces via a balcony, and via a glass floor/ceiling. From the balcony high above the physical playroom, it is possible to look and be seen by people in the physical playroom itself - both directly by looking down through gaps in the balcony fence, and indirectly by looking up to the fully mirrored ceiling. Prominent in the ceiling of the crafts room, and the floor of the contemplative play space above is a transparent "pool", approximately two metres long and wide. This slightly tinted, reinforced glass container suspended between the two levels is accessible by using a small ladder to climb down from the contemplative playroom on the top floor.

2. TWO PROVOCATIVE "ROBOTS"

To explore the potential for systems to foster play between different spaces, we designed the following two provocative prototypes.

2.1 Drawing Raiser

We were inspired by our earlier impromptu intervention in which we introduced whiteboard markers into the glass pool and then from below raised objects on the end of broomsticks against the glass as stencils. The *Drawing Raiser* was a three-meter tall cardboard construction simply styled to evoke a minimalistic android. One meter up the front of this "robot" was a letterbox resembling slot. This construction was designed to explore potential connections between children in the glass pool, and the craft room below. Inside the contraption was a researcher holding a pole that supported the android's flat "hat". Their role as the operator was to receive children's artwork through the letterbox and then use the hat as a platform to raise the artwork up to the glass ceiling where the children above might use it as a stencil (figure 2.1).



Figure 2.1 Cardboard drawing platform offers stencils to connect two levels through a glass floor

2.2 Hungry Princess

An earlier simple intervention blowing soap bubbles from the balcony inspired us to make the *Hungry Princess* - a creature with an enormous tongue. The characters' head was a cardboard construction 2-meters tall. We positioned this head on the balcony. Its face was a cartoon style painting with oversized eyes and lips. The head was angled so that it protruded over the balcony safety rail and thus the huge face was visible in most parts of the room below. A dark-reddish 8-metre long shiny strip of fabric drooped out of the creature's lips, hanging all the way to the floor below (figure 2.2b). A researcher was concealed inside the head of the creature. Turning a cardboard steering wheel on the side of the head (figure 2.2a) influenced the operator's lowering and raising of the tongue. On the floor far below, we spread Velcro backed cut-outs, each depicting a common food e.g., carrots, and burgers (figure 2.2c). Velcro patches were also fixed to the tip of the tongue. We intended to explore if, and how children responded to an opportunity to choose a meal, and maneuver foodstuffs up into the creature's mouth.



Figure 2.2a Children on the balcony could spin a wheel to manipulate the giant fabric tongue



Figure 2.2b. Children on ground floor interact with distended tongue of cardboard "robot"



Figure 2.2c Fabric tongue tip and food cut-outs

3. TESTING AND RESULTS

Both cardboard "robots" were placed in the venue for two testing sessions, lasting on average approximately two hours. Research team members made observations from both upper and lower floors, and then post-test interviewed each contraption's operator.

3.1 Drawing Raiser

Using whiteboard markers on a glass floor proved to be very engaging. However, initially, most children in the pool showed little interest in responding to artworks raised up to them. Subjects appeared to prefer stencils with themes more typically associated with their own gender. Offering up a spider to trace was a catalyst for one boy (aged circa 7 years) to move away from his independent doodling and seemingly give full attention to a series of artworks pressed against the ceiling. His tracings were so energetic that after ten minutes, he covered the glass with so many marks that it became more difficult for him to see what he was tracing. However, he refused any gentle hints or suggestions to use any of the dry-wipe erasers. Downstairs in the craft room, the white "robot" received a lot of attention at first, but apprehending its intended functioning and purpose required an observer stationed in the classroom to give explanations and demonstrations.

Some children mainly boys (aged 6-7) from the craft room seemed to find it much more interesting to walk (and sometimes run) upstairs and use their stencil, rather than wait to see if, and how a child already in the pool might respond. We saw much fewer instances of children that first drew on the glass making the opposite journey, i.e. going downstairs to contribute artworks to be raised up as stencils. While the operator added and removed drawings from the platform, it was possible for the children directly above the contraptions to view the operator. After children in the pool caught a glimpse of the operator, this seemed to increase their interest in the setup. Several children upstairs initiated non-verbal communication directly with the operator via tapping on the glass, hand waving and other gestures. As operators, we could not help ourselves in visibly responding to such overtures, and so we smiled or waved back, but tried to take these moments of self-recognition as chances to

non-verbally encourage children to use the raised artworks as stencils.

3.1 Hungry Princess

The giant tongue attracted the attention of most children (a mix of boys and girls aged 6-7) entering the ground floor physical activity room. Selecting cardboard food elements to the Velcro tongue tip was a popular activity. Since there were only a limited number of Velcro contact points, the selection of which food was to be attached to the tongue provoked lively debate amongst groups of children. Several children also brought objects such as soft toys from elsewhere and made unsuccessful attempts to attach these to the Velcro. Other children experimented with tugging hard on the tongue. It was through the play that our name for this contraption emerged - it was children themselves that declared "her" to be a "Hungry Princess". One girl explained this was because the behavior of the creature resembled the fairy tale character *Rapunzel* who draped her long hair down to the ground from the top of a prison tower.

On the balcony, children initially shrieked with delight when winching the fabric upwards. They also got excited and turned the cardboard wheel so fast that it snapped off and required ad-hoc strengthening. Our primary concern in operating the contraption was offering a dynamic experience rather than perfect mapping between input and output, so the direction of the tongue's movements was a bit random. Perhaps due to sensing such imperfections, children on the balcony became less interested controlling the tongue but increasingly keen on discovering what was inside the cardboard box. They pressed and pulled with their fingers all areas of its surface to gain access. A second member of the research team was positioned nearby on the balcony making observations. At a moment when children were particularly frantic in trying to get in, one child asked the observer "is there a man inside?". The observer responding truthfully but negatively, saying that "it was a girl". The children then tried to converse with the operator, but they did not share a common language. Instead, the female operator then began to sing in their native Chinese, which provoked much laughter from the children but seemed to increase further their efforts to find a way into the box.

Children on the balcony were less engaged than those downstairs. The children downstairs also far more frequently initiated communication with those on the balcony. E.g. yelling "What do you want tongue?" or "Come down! We have food". Loud voices from the balcony to downstairs were mainly replies to questions about preferred food. These were typically very brief, e.g. "carrots please!".

4. DISCUSSION

4.1 Draw to lead or follow?

To children interacting with the drawing platform, it seemed of little importance that other children were either tracing their drawings or were the source of what they outlined. For them, their mark making was much more interesting than the social experience we attempted to foster. Similarly, for children on both the balcony and the ground floor of the physical playroom, interacting with children nearby and the fabric tongue were of much higher interest than children and events in the other space. This partly could be a question of scale - children on a different level were further away, and smaller, so their peers on a different level might seem too far away to be interesting, relevant or reachable. Screen technologies offer means to bring the actions and expressions of users on one level to appear at a similar scale in a different space. However, using gender-specific content should be avoided in order to not preclude cross-gender exchange.

4.2 Transparent functioning

Based upon children's frantic efforts to gain access to the interior of the Hungry Princess, highlights how children can have a keen interest in how a large and unusual artefact operates. Therefore we suggest systems for connecting spaces should be transparent in their functioning - this may also help attract more engagement from potential users. For instance, in a possible mechatronic version of the Drawing Raiser, the machine's manipulation of the paper should be visible at all times. Seeing the raising mechanism seems likely to provoke more interest and participation than closed "black box" cardboard system. Likewise, screen-based approaches for interspace connecting play might benefit from making placement of cameras very obvious. Translucent functioning will also help avoid undesirable surprises that may result from tricking them into unwitting (Sherindan, Bryan-Kinns and Bayliss 2007) social interactions.

4.3 Potential for sound

The impact of our Chinese singing alerts us to the potential utility of interactive sound. In our field test, it was not just the singing that increased engagement, but the localization and responsiveness of the audio. I.e., children could sense that the sound was coming from inside the box and that their behavior was influencing what they heard. For connecting play between spaces, audio has potential in many different ways. E.g. as a medium of one or two-way communication in itself, or for attracting attention, instructing participation, or rewarding engagement.

4.4 Improving This Approach

This form of user engagement thus became more like collaborative physical sketching rather than the provocative concept test that we intended. User reactions were very varied, including many responses that caught us completely unawares. Also, actions we took ourselves (such as singing in Chinese) were also highly improvisational, which in turn led to more surprises from visitors. We found ourselves more disposed towards entertaining the children through the giant robots, rather than systematically investigating a carefully selected hypothesis. We see a strength of using such Wizard-of-Oz style robots is how many aspects of their behavior can be instantly "reprogrammed" on the spot in attempts to enhance user experiences. Such ad hoc testing has high utility for generating and exploring new design directions. However, in future, we wish to strike a balance between freestyle experimentation with users and a carefully planned research study. Before future field trials, we plan many improvements. Firstly, we will conduct full scale "dress rehearsals" with research team members roleplaying all the possible actions of children that we can imagine. We do not expect that we can anticipate every eventuality, but such a walkthrough will make for a more robust test. Secondly, we plan to informally interview children and accompanying adults after they finish their interaction.

The operators of the cardboard "robots" were frequently unclear concerning the actions of other people in the space, and even the status of their contraption, e.g. whether they were any food on the tongue. More convincing performing of simulated robots requires more efficient coordination between operators and field observers. We suggest equipping operators and observers with radios or mobile phones. Using headsets should enable more discrete communication between choreographing of large-scale fake robots.

5. CONCLUSION

Deploying two large cardboard "robots" into a children's playhouse has brought several insights for connecting two spaces within this venue. With the next phase of our interactive prototyping, we plan to also explore how our digital-physical designs are responded to in several different child-centered venues. We hope to raise discussion on a dilemma regarding two overarching design strategies. Namely, which is more practical, desirable and ethical: To engage children via attractive experiences that happen to lead to social ones? Or to offer social experiences that appear the more attractive options than solo play?

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